METHOD OF ASSIGNING TRANSMISSION CHANNELS IN A TELECOMMUNICATIONS NETWORK AND USER STATION

Background Information

The present invention relates to a method of assigning transmission channels in a telecommunications network and to a user station according to the definition of the species in the independent claims.

In mobile radio systems of the third generation, for example in accordance with the UMTS standard (Universal Mobile Telecommunication System) or the like, two concepts or modes are provided for transmitting signals via an air interface between a base station and a mobile station, depending on the transmission resource used. If various frequency bands are provided as a transmission resource, an FDD mode (Frequency Division Duplex) is used, in which two different frequency bands are used to transmit the signals for the uplink transmission direction from the mobile station to the base station and for the downlink transmission direction from the base station to the mobile station. If time slots are used as a transmission resource, the TDD mode (Time Division Duplex) is used, in which different time slots are used for the uplink transmission direction and the downlink transmission direction while using the same frequency band. Further channel separation is possible for both modes in this case by using a CDMA method (Code Division Multiple Access). The transmission channels for connections between one or more base stations and various mobile stations may be separated from one another by different codes, with the same transmission resource being used, for example, the same time slot and/or the same frequency position. In both modes, the code assignment for the transmission channels to be set up is coordinated by the mobile wireless network, so that no code is used multiple times.

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However, in uncoordinated operation the base stations are not linked via a higher-order system, so that coordinated code assignment is not possible. Such operation is, for example, advisable for the home sector with cordless telephones, in which, under certain circumstances, many individual base stations may be operated independently from one another. In this case, the code assignment may no longer be coordinated. Therefore, only one single base station may be active per transmission resource, i.e., for example, per time slot or per frequency band, but possibly even using multiple different codes for this purpose. This transmission resource is occupied for a neighboring base station, since it does not know the codes used there. The occupation of the transmission resource may be detected in this case by the neighboring base station through a power measurement. The neighboring base station may then accordingly substitute other transmission resources, i.e., for example, other time slots or frequency bands.

Advantages of the Invention

The method according to the present invention for assigning transmission channels in a telecommunications network and the user station according to the present invention having the features of the independent claims have the advantage in contrast to the related art that, in uncoordinated operation of the base stations, at least one of the transmission channels is assigned for transmitting signals between one of the base stations and one of the mobile stations as a function of a channel measurement, in which the transmission power on all possible transmission channels is measured, if the previously measured transmission power on this transmission channel is minimal. In this way, the capability is provided of distributing the existing transmission channels optimally on the connections set up or to be set up for transmitting signals between the base stations and the mobile stations, so that the capacity of the telecommunications network, and

therefore the number of connections to be set up simultaneously in the telecommunications network, may be increased, or even maximized. One and the same transmission channel may even be used simultaneously by various base stations when, due to a limited range, they influence one another insignificantly or not at all.

Advantageous refinements and improvements of the method of assigning transmission channels in a telecommunications network and the user station according to the independent claims are possible through the measures described in the subclaims.

It is particularly advantageous that codes are provided, through which at least one transmission resource, particularly a time slot or a frequency band, is spread using multiple transmission channels for transmitting signals between the base stations and the mobile station and the channel measurement includes a code measurement, in which a received signal for each transmission resource is despread using each allowed code in order to measure the transmission power in each of the transmission channels. In this way, the capability is provided of a transmission resource, for example a time slot or a frequency band, being used jointly simultaneously by different base stations. A transmission resource, for example a time slot or a frequency band, may be used jointly simultaneously by multiple transmission channels in this way. Through this division of the transmission resources, the capacity of the telecommunications network, and therefore the number of connections to be set up simultaneously in the telecommunications network, are also increased.

It is advantageous in this case that the channel measurement for the assignment of at least one of the transmission channels between one of the base stations and one of the mobile stations is carried out when a connection is being established. In this way, the capacity of the

telecommunications network is used at the earliest possible time for every connection to be set up.

It is particularly advantageous that the channel measurement for the assignment of at least one of the transmission channels is carried out during an existing connection between one of the base stations and one of the mobile stations, the connection quality of the existing connection is measured in parallel, and, if the connection quality falls below a preselected value, a channel change is carried out and at least one new transmission channel is assigned as a function of the channel measurement of the existing connection. In this way, dynamic channel assignment may be implemented for one or more existing connections, so that all of the transmission channels just assigned to an existing connection have the highest possible connection quality.

In addition, it is advantageous that, for at least one of the base stations, specific information is transmitted via a broadcast channel to all of the mobile stations lying in the reception range of this at least one base station and the broadcast channel is changed if the interference detected thereon exceeds a preselected value. In this way, dynamic assignment of the broadcast channel to at least one of the base stations is possible, the broadcast channel just used having as little interference as possible.

A further advantage is that at least one of the transmission channels is reserved for use as a broadcast channel. In this way, the expense and the time for the mobile stations for finding the broadcast channel is reduced, since they may find the broadcast channel from an already selected or preselected set of transmission channels.

It is particularly advantageous that, for the case in which the transmission capacity of the transmission channels established thus far for assignment is not sufficient, at

least one transmission channel scrambled using a new scrambling code is assigned for transmitting signals between one of the base stations and one of the mobile stations as a function of a channel measurement, in which the transmission power on all possible transmission channels is measured after scrambling using a scrambling code, if the transmission power measured on this scrambled transmission channel is minimal. In this way, situations are avoided in which a base station in uncoordinated operation no longer finds any free transmission channels because, for example, one or more other base stations already occupy all of the transmission channels. Rather, the number of transmission channels and therefore the data rate may be increased even further by using scrambling codes.

Drawing

Exemplary embodiments of the present invention are illustrated in the drawing and explained in more detail in the following description. Figure 1 shows a block diagram of a user station according to the present invention, Figure 2 shows a code-time slot diagram, Figure 3 shows a first arrangement of base and mobile stations in a mobile radio network, and Figure 4 shows a second arrangement of base and mobile stations in a mobile radio network.

Description of the Exemplary Embodiments

In Figure 1, 15 identifies a user station of a telecommunications network 5. Telecommunications network 5 may, for example, be implemented as a landline network or as a mobile radio network. If telecommunications network 5 is implemented as a mobile radio network, then user station 15 may be a base station 11, 12 or a mobile station 21, 22 of telecommunications network 5 shown in Figure 3. In the following, it is assumed for exemplary purposes that telecommunications network 5 is implemented as a mobile radio network and user station 15 is implemented as base station 11,

12 or as mobile station 21, 22. Mobile radio system 5 and user station 15 may, for example, be implemented in this case according to the GSM standard (Global System for Mobile Communication), according to the UMTS standard (Universal Mobile Telecommunication System), or the like.

User station 15 illustrated in Figure 1 includes a receiver 25, to which a receiving aerial 60 is connected. As shown in Figure 1, user station 15 also includes a transmitter 35, to which a transmitting aerial 70 is connected. Receiving aerial 60 and transmitting aerial 70 may also be combined into a combined transmitting/receiving aerial by using a multiplexer, for example. On the one hand, receiver 25 is connected on the output side to an input of means 30 for code measurement and, on the other hand, it is connected to an input of a despreading device 45. Codes of a first code memory 51 are, in addition, supplied to means 30 for code measurement. At least one code of a second code memory 52 is, in addition, supplied to despreading device 45. Means 30 for code measurement are connected on the output side to an input of means 10 for channel measurement. Despreading device 45 is connected on the output side to an input of means 40 for measuring the connection quality. An output of means 40 for measuring the connection quality is, in addition, also supplied to means 10 for channel measurement. Means 10 for channel measurement are connected on the output side to an input of means 20 for channel assignment, whose output is supplied to transmitter 35.

In the following, it is to be assumed that both a first base station 11 and a second base station 12 in mobile radio network 5 shown in Figure 3 have the construction of user station 15 shown in Figure 1. It is also to be assumed that both first mobile station 21 and second mobile station 22 have the construction of user station 15 shown in Figure 1. As shown in Figure 3, first base station 11 covers a first radio cell 61, in which it may reach mobile stations using radio

signals. Second base station 12 covers a second radio cell 62, in which it may reach mobile stations using its radio signals. First mobile station 21 is positioned in first radio cell 61, while, in contrast, second mobile station 22 is positioned in second radio cell 62. A first connection 41 is to be established between first base station 11 and first mobile station 21, while, in contrast, a second connection 42 is to be established between second base station 12 and second mobile station 22.

Two different concepts or modes may be provided for first connection 41 and for second connection 42. On the one hand, there is the FDD mode (Frequency Division Duplex), in which two different frequency bands are used as a transmission resource for the uplink transmission direction from respective mobile stations 21, 22 to assigned base stations 11, 12. On the other hand, there is the TDD mode (Time Division Duplex), in which different time slots in the same frequency band are used as a transmission resource for the uplink transmission direction and the downlink transmission direction. In both modes, the respective transmission resources used may be spread into multiple transmission channels in each case by using codes C. The use of such codes is based in this case, for example, on the principles of a CDMA method (Code Division Multiple Access) for further channel separation. In this case, one frequency band or one time slot may each be spread out into multiple transmission channels by using different codes. One such transmission resource, for example one time slot or one frequency band, may be used simultaneously by various connections and/or by one and the same connection in the uplink or in the downlink transmission direction by using different codes, so that the capacity of mobile radio network 5 and/or the connections which may be set up in mobile radio network 5 is increased by increasing the number of usable transmission channels. Using the example of transmission resources implemented as time slot ZS, spreading out into multiple transmission channels by using different codes C is

illustrated using Figure 2. It is to be assumed in this case that fifteen time slots are provided per transmission frame, which are provided on the abscissa numbered from 0 to 14 in Figure 2. Four different codes C from 1 to 4 are then plotted on the ordinate, so that each time slot ZS is spread into four different transmission channels, which differ from one another due to different coding, using the same spread factor 4. The transmission channels arising in this way may be illustrated as raster elements in the code-time slot diagram shown in Figure 2 and are indicated as a whole using reference number 1.

In the following, time slots for transmitting signals in mobile radio network 5 are to be used as an example of a transmission resource. Base stations 11, 12 are to be operated uncoordinatedly and are not to be connected via a higher order system, so that coordinated code assignment is not possible. Such uncoordinated operation is, for example, also advisable for the home sector when using mobile stations 21, 22 implemented as cordless telephones, since in this case many individual base stations are, under certain circumstances, operated independently from one another and therefore uncoordinatedly. For the application of cordless telephony, telecommunications network 5, base stations 11, 12, and mobile stations 21, 22 may, for example, be implemented in accordance with the DECT standard (Digital European Cordless Telecommunications). In such uncoordinated operation, code assignment for the individual connections to be set up between base stations 11, 12 and mobile stations 21, 22 is no longer possible in a coordinated way.

In the following, first connection 41 to be set up between first base station 11 and first mobile station 21 will be described for exemplary purposes. While the connection is being established, it is checked by means 30 for code measurement, either in first base station 11 or in first mobile station 21, which codes C in which time slots ZS are

already occupied by other connections. For this purpose, the signal for each of fifteen time slots ZS received in first base station 11 and/or first mobile station 21 must be despread using each permitted code C stored in first code memory 51, which corresponds to demodulation in the CDMA method. Through despreading in means 30 for code measurement, all transmission channels 1, which are each implemented as a code/time slot combination, are extracted from the received signal in this way. As shown in Figure 2, there are sixty transmission channels in this case, which result from the multiplication of fifteen time slots ZS by four codes C. Transmission channels 1 extracted in this way are then supplied to means 10 for channel measurement, which measures the transmission power on all extracted transmission channels 1. First connection 41 to be set up is then assigned to at least one of transmission channels 1 by means 20 for channel assignment. In this case, the transmission channel whose previously measured transmission power is minimal is assigned to first connection 1. For a full duplex connection to be set up between first base station 11 and first mobile station 21, the method described is to be carried out both for the uplink transmission direction from first mobile station 21 to first base station 11 and for the downlink transmission direction from first base station 11 to first mobile station 21, so that at least one transmission channel may be used for first connection 41 in each of the two transmission directions. In Figure 3, the downlink transmission direction is illustrated by the arrow for both first connection 41 and second connection 42. In the following, first connection 41 is considered again. In this case, the channel measurement for assigning at least one of transmission channels 1 may be carried out in the uplink transmission direction by first base station 11 and the channel measurement for assigning at least one of transmission channels 1 may be carried out in the downlink transmission direction by first mobile station 21. The assignment of the at least one of transmission channels 1 selected through the channel measurement in the uplink

transmission direction may then be carried out by first base station 11. The assignment is performed in this case by its means 20 for channel assignment, which, via transmitter 35 of first base station 11, transmits a corresponding signal in regard to the at least one assigned transmission channel to first mobile station 21. In a corresponding way, the assignment of at least one of transmission channels 1 in the downlink transmission direction may be carried out by first mobile station 21, whose means 20 for channel assignment transmit a signal via corresponding transmitter 35 to first base station 11 in this case, in order to make the at least one transmission channel selected for the downlink transmission direction known in first base station 11.

According to the exemplary embodiment described here, in this case a first transmission channel 31, which represents a combination of the third time slot and the second code shown in the code/time slot diagram in Figure 2, is assigned for the downlink transmission direction of first connection 41.

Before establishing first connection 41, first base station 11 initially selects one of transmission channels 1 and uses it as a broadcast channel. According to the exemplary embodiment described here, first base station 1 selects a combination of first time slot and third code, as shown in the code/time slot diagram in Figure 2, as broadcast channel 50. The specific information for first base station 11 is transmitted via broadcast channel 50 to all mobile stations located in first radio cell 61. This specific information contains, for example, the codes used by first base station 11, an identification of first base station 11, synchronization information, information about transmission channels and/or code/time slot combinations already used, information about paging messages which exist for one or more of the mobile stations located in first radio cell 61, etc. First mobile station 21 located in first radio cell 61 therefore recognizes first base station 11 assigned to it by synchronization on

broadcast channel 50 and analysis of the information transmitted via this broadcast channel 50.

In principle, each of transmission channels 1 may be used as broadcast channel 50. In order to avoid interference of the broadcast channels of different base stations 11, 12, there is the possibility of changing the broadcast channel if needed. In this case, it may be provided that the broadcast channel is changed if the interference detected on it due to other broadcast channels or other transmission channels exceeds a preselected value. In order that the outlay of first mobile station 21 described in this example is reduced while finding broadcast channel 50, either a special code C may be reserved and/or preselected for any desired time slot ZS or a specific time slot ZS may be reserved and/or preselected for any desired code C for the broadcast channel of first base station 11. A prereserved selection of any desired specified transmission channels and/or code/time slot combinations for use as a broadcast channel 50 suggests itself as a third possibility.

During existing first connection 41, the transmission power is cyclically remeasured in the way described on all possible transmission channels 1, so that a picture of free and occupied and/or of malfunctioning and functioning transmission channels is continuously available. In parallel to this, the connection quality of existing first connection 41 is measured by means 40 for measuring the connection quality in first base station 11 and/or in first mobile station 21, for example on the basis of the transmission error rate. If the connection quality falls below a preselected value, a channel change to another transmission channel and/or another code/time slot combination is then carried out. For this purpose, the transmission powers of the transmission channels and/or code/time slot combinations previously not used for first connection 41 must be continuously monitored, as described. For the channel change, in this case first base station 11

measures the connection quality of first connection 41 in the uplink transmission direction and first mobile station 21 measures the corresponding connection quality of first connection 41 in the downlink transmission direction. If the connection quality falls below a preselected threshold, the channel changes in the uplink and downlink transmission directions occur independently from one another. For this purpose, three concepts are possible, as for the establishment of the connection. In a first concept, the channel change is performed solely by base station 11, since it already knows all of the transmission channels it uses. For this purpose, first mobile station 21 transmits, via its transmitter 35, the measurement results of the connection quality or the request for a channel change due to such measurement results for the downlink transmission direction to first base station 11. In the second concept, first mobile station 21 initiates the channel change in the downlink transmission direction and first base station 11 initiates the channel change in the uplink transmission direction. The third concept is oriented to the DECT standard, in which the channel change is initiated by first mobile station 21 both in the uplink and in the downlink transmission directions and first base station 11 merely signals to first mobile station 21 that a channel change is necessary in the uplink transmission direction. Regardless of whether the connection quality is measured in first base station or in first mobile station 21, this measurement is performed in that the transmission channels to be evaluated for first connection 41 are extracted from the signal received via corresponding receiver 25 by respective despreading device 45 with the aid of the code(s) assigned to first connection 41, which is/are stored in second code memory 52, and supplied to means 40 for measuring the connection quality. In means 40 for measuring the connection quality, the connection quality of the transmission channels for first connection 41 is then, for example, measured on the basis of the transmission error rate. In parallel to this, means 30 for code measurement extract all transmission channels 1 from the

signal received via receiver 25 with the aid of the codes stored in first code memory 51 and supply these transmission channels to the channel measurement in first means 10 for channel measurement, which measure the transmission power on extracted transmission channels 1. Means 10 for channel measurement now check, with reference to the value of the connection quality of the respective transmission channel of first connection 41 determined by means 40 for measuring the connection quality, whether this value falls below a preselected value for the connection quality. If this is the case, means 10 for channel measurement select the transmission channel which has the minimum transmission power and cause means 20 for channel assignment to subsequently use this transmission channel for first connection 41 instead of the corresponding transmission channel measured by means 40 for measuring the connection quality, which has too low a connection quality.

In Figure 3, a scenario is illustrated in which first base station 11 and second base station 12 are operated independently from one another. One mobile station 21, 22 is registered in each of two base stations 11, 12. First mobile station 21 is initially located at a first position A within first radio cell 61, illustrated in Figure 3, and has a first transmission/reception range 71. Second mobile station 22 is located at a third position C in second radio cell 62 and includes a second transmission/reception range 72. First mobile station 21 may transmit and receive radio signals within first transmission/reception range 71 in this case. Signals transmitted outside this first transmission/reception range 71 may no longer be received by first mobile station 21. In addition, signals transmitted by first mobile station 21 outside first transmission/reception range 71 may no longer be received in second base station 12 and in second mobile station 22. The corresponding is true for second transmission/reception range 72 of second mobile station 22. In this case, the same transmission channels and/or code/time

slot combinations are simultaneously used in the uplink and in the downlink transmission directions for both first connection 41 and second connection 42. As shown in Figure 2 and Figure 3, first transmission channel 31 is used for the downlink transmission direction for both first connection 41 and second connection 42 in this case. The case of the channel change described in the following applies for both the uplink and the downlink transmission directions, both being independent from one another. Both mobile stations 21, 22 are sufficiently distant from one another so that their transmission/reception ranges 71, 72 do not overlap and do not mutually interfere in their transmission channels. The instantaneous transmission quality is measured for both connections 41, 42 in the way described, both in the uplink and in the downlink transmission directions, for example by analyzing the transmission or bit error rates. Both mobile stations 21, 22 cyclically establish the transmission power of all possible transmission channels 1 and/or code/time slot combinations, by despreading all transmission channels 1 and/or code/time slot combinations in the way described through means 30 for code measurement and establishing the transmission power on transmission channels 1 extracted in this way through means 10 for channel measurement and storing this transmission power in tabular form in a memory not illustrated in Figure 1. Smaller values of the transmission power measured signal little or no interference in this case. If first mobile station 21 now moves from first position A into second position B and therefore, as shown in Figure 3, into second radio cell 62 and/or into second transmission/reception range 72 of second mobile station 22, the mutual interference of the transmission channels used increases and the connection quality is therefore reduced. If it falls below the preselected value for the connection quality, then a channel change is initiated in the way described for at least one of the two connections 41, 42 and this connection is assigned at least one new transmission channel in the uplink and/or in the downlink transmission direction.

In a modification of Figure 2, despreading individual time slots ZS by more or less than four codes C may also be provided.

According to the exemplary embodiment described here, however, all fifteen time slots ZS per transmission frame are spread using four codes C, so that a total of 60 transmission channels results. According to the exemplary embodiment described, both first base station 11 and second base station 12 may thus access 60 such transmission channels if there is no interference, so that a total of 60 connections may theoretically be carried out simultaneously within the geographical range defined by first radio cell 61 and by second radio cell 62, if the reservation of transmission channels for setting up a broadcast channel for each of the two base stations 11, 12 is not considered.

A further exemplary embodiment is illustrated in Figure 4. In this case, 310 identifies a radio coverage area, for example a shared radio cell, in which a third base station 110 and a fourth base station 210 are operated independently from one another and uncoordinatedly. In this case, TDD operation using a CDMA method is to be assumed for exemplary purposes, as described. Telecommunications network 5 may again, as described, be implemented as a mobile radio network or as a cordless telephone network in this case.

Third base station 110 and fourth base station 210 are locally positioned directly adjacent to one another in this case and only separated from one another by a wall 320, which does not, however, represent an obstruction for the radio frequencies used for transmission and is to indicate that both base stations 110, 210 are, for example, positioned in neighboring office rooms. Third base station 110 supplies a third mobile station 120 via a third connection 140 and a fourth mobile station 130 via a fourth connection 150. Third connection 140 and fourth connection 150 represent radio connections in the

TDD mode in this example, as described. In this case, it is to be assumed for exemplary purposes that third connection 140 and fourth connection 150 together require a data rate so high that all of the transmission channels of the TDD mode available are used. Fourth base station 210 now wishes to establish a fifth connection 240 to a fifth mobile station 220 in the TDD mode using the CDMA method. For this purpose, as in the exemplary embodiment shown in Figure 3, all transmission channels available in radio coverage area 310, i.e., code/time slot combinations, are checked as to whether they are already occupied or have interference which causes them to fall below the preselected value for connection quality. If so, the corresponding transmission channel is unusable, otherwise it is usable. If all transmission channels in radio coverage area 310 are unusable or the number of the usable transmission channels still available for fifth connection 240 is smaller than the number of transmission channels necessary for fifth connection 240, fourth base station 210 recognizes this.

In order nonetheless to be able to establish fifth connection 240 without producing unacceptable interference for already existing third connection 140 and already existing fourth connection 150, fourth base station 210 changes a scrambling code used jointly by it and third base station 110.

As a rule, one single scrambling code is used within a radio cell. All signals which are transmitted in the radio cell are scrambled using this scrambling code in this case. In order that signals of different neighboring radio cells do not mutually interfere, particularly if a CDMA method is used, they are scrambled using different scrambling codes, i.e., neighboring radio cells use different scrambling codes. The various scrambling codes are selected in this case in such a way that they have the smallest possible cross correlation with one another for any desired mutual time shifts. The spreading of the signals within a radio cell is then performed

with the aid of orthogonal codes which are mutually uncorrelated due to the synchronous transmission.

This concept is now abandoned in the case of insufficient transmission capacity described, in that in radio coverage area 310, which is to represent a shared radio cell in this example, a scrambling code is introduced for fourth base station 210 which is different from the scrambling code of third base station 110.

Subsequently, the search for and possible assignment of sufficient interference-free transmission channels for fifth connection 240 to be established are repeated in the way described for the exemplary embodiment with reference to Figures 1 to 3, but using the new scrambling code.

This procedure is repeated until a sufficient number of sufficiently interference-free transmission channels have been found and assigned to fifth connection 240.

If enough sufficiently interference-free transmission channels are not found, a further scrambling code may be checked in the way described and also used if necessary. This procedure may be repeated until an "unused" scrambling code having enough sufficiently interference-free transmission channels is found.

On the basis of the scenario described, a sixth connection 250 is now to be established in the TDD mode using the CDMA method from fourth base station 210 to a sixth mobile station 230, as shown in Figure 4. In this case, fifth connection 240 is to require a data rate so high that insufficient transmission channels are available for sixth connection 250, even with scrambling using the new scrambling code because, for example, all transmission channels having the new scrambling code are used by fifth connection 240. The new scrambling code is referred to in the following as the first new scrambling code.

For sixth connection 250, fourth base station 210 may now introduce a second new scrambling code, which differs from the first new scrambling code and the original scrambling code possibly used by fourth base station 210, all scrambling codes used to have the characteristic described of low mutual cross correlation for any desired mutual time shift.

The search for and possible assignment of sufficient interference-free transmission channels for sixth connection 240 to be established are then performed again in the way described for the exemplary embodiment shown in Figs. 1 to 3, but using the second new scrambling code.

This procedure is also repeated until a sufficient number of sufficiently interference-free transmission channels has been found and assigned to sixth connection 240.

If enough sufficiently interference-free transmission channels are not found, a further scrambling code may be checked and possibly used in the way described. This procedure may be repeated until an "unused" scrambling code having enough sufficiently interference-free transmission channels is found.

For a connection to be established between one of base stations 110, 210 and one of mobile stations 120, 130, 220, 230, various scrambling codes may also be used if the data rate necessary for this connection and the available sufficiently interference-free transmission channels require this.

Therefore, if it is established in the uncoordinated operation described that the connection quality of all or many transmission channels is, for example, becoming worse due to interference, the attempt may be made, as described, to reduce the influence of interference by substituting other scrambling codes.

In this case, the use of different scrambling codes may lead to the transmission capacity of locally delimited telecommunications network 5 in uncoordinated operation being many times greater than that in coordinated operation.

The search for previously unused scrambling codes may either be performed according to a fixed sequence or by random selection of a scrambling code in each case.

Third base station 110, fourth base station 210, third mobile station 120, fourth mobile station 130, fifth mobile station 220, and sixth mobile station 230 are each to have the construction and the mode of operation described for user station 15 shown in Figure 1. At the same time, means 10 for channel measurement may produce the new scrambling code(s) and carry out appropriate scrambling of the transmission channels to be measured

The measurement and assignment of transmission channels scrambled in this way, and therefore also the change of the scrambling code, may be performed in this case both in base stations 11, 12, 110, 210, for example for the uplink transmission direction, and in mobile stations 21, 22, 120, 130, 220, 230, for example for the downlink transmission direction.

The search for new scrambling codes may be performed permanently or as needed.